

Esthetic and biologic mode of reattaching incisor fracture fragment utilizing glass fiber post

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Abstract

Trauma to the anterior teeth affects the esthetic and psychological well-being of the patient. Advancement in the adhesive dentistry has facilitated the restoration of the coronal tooth fractures by minimally invasive procedures when the original tooth fragment is available. Reattachment of fractured fragment offers immediate treatment with improved preponderant aesthetics and restoration of function. Here, we describe a case of complicated fracture of the maxillary left immature permanent central incisor, which was treated endodontically followed by esthetic reattachment of the fractured fragment using the glass fiber post. Functional demands and esthetic considerations of the patient were fully met with this biologic mode of fragment reattachment.

Key words: Fragment reattachment, tooth fragment, traumatic injury

INTRODUCTION

Crown fractures in the anterior permanent teeth represent 92% of all traumatic injuries of the permanent teeth.^[1] Fractures of the anterior teeth in addition to affecting the function, and aesthetics, can be psychologically distressing to the patient. Advances in adhesive dentistry now offer endodontic options to reattach fractured fragments based on the extent, direction, and severity of the fracture.^[2] Compared to the traditional approach of using composite resins, interlocking pins, jacket crowns to fix fractures, minimally invasive technique of reattachment of the fractured fragment is gaining popularity. Reattachment of natural tooth fragment provides better esthetics, natural wear resistance similar to surrounding dentition, original tooth contour, translucency, and surface texture. It also impacts positive psychological response from the patient.

The success of reattachment depends on various factors such as fracture site, periodontal status, pulpal involvement, maturity of root formation, biological width invasion, and material used for reattachment.^[3] The reattachment procedure gets even more complex when there is a multiple fracture fragment that has to be connected to each other. Reconstruction with resin is a better therapeutic decision when there is not a good adaptation between the fragment/fragments and the remaining tooth.^[4] The present case

report describes the management of a fractured maxillary left central incisor treated endodontically followed by fracture fragment reattachment using the glass fiber post. The fracture fragment was intact and available as one single unit, which adapted optimally to the remaining tooth structure; hence, reattachment of the natural crown fragment was the better option.

CASE REPORT

A 10-year-old male patient reported to the dental clinic with the chief complaint of broken upper left front tooth associated with pain and sensitivity. A detailed history revealed the etiology as a fall from stairs 24 h back. The fractured tooth fragment was retrieved by the patient's mother from the site of injury and was stored in water. Medical history and other events associated with injury were noncontributory. Intraoral clinical examination revealed that maxillary left central incisor had undergone complicated horizontal crown fracture in the cervical one-third [Figure 1]. Palatally, the fracture line was oblique. The fracture fragment was intact, and it was approximating optimally with the remaining tooth structure [Figure 2]. The fragment was transferred to normal saline immediately to prevent dehydration. No mobility was noted in the fractured tooth. An intraoral periapical radiograph was advised to evaluate the extent

of the fracture, the root status and to rule out an alveolar bone fracture. The fracture line was passing through the coronal pulp with the open root apex and without any alveolar bone fracture. Electric and thermal pulp testing were performed to evaluate the pulp vitality of all the upper anterior teeth, and the result was negative only on tooth number 21 whereas, all the adjacent teeth displayed a normal response. Hence, the diagnosis was established as Ellis Class III fracture with an open apex.

A treatment plan was formulated which included apexification with mineral trioxide aggregate (MTA) followed by root canal treatment and either composite build up or reattachment of the fragment using fiber post. Parental informed consent was obtained after explaining the advantages and disadvantages of composite resin build versus reattachment. Since esthetics was the prime concern, fragment reattachment was considered as the best option. The fracture fragment was cleaned and rinsed with 2% chlorhexidine solution and lightly air-dried. Under local anesthesia, root canal treatment was initiated, followed by

single step MTA apexification. The canal was obturated with gutta-percha points. Postspace was created by removing gutta-percha using peeso reamers. Since aesthetics was a concern, the prefabricated glass fiber post was used. A radiograph of the trial placement of glass post was taken to confirm the postposition. The coronal portion of the post was cut to fit into the fractured fragment. Key and lock system was used to attach the fragment with the post, for which an internal retention slot was placed on the dentin of the fracture fragment using a no 4 round bur [Figure 3].

Conditioning of the root canal walls was performed using 37% phosphoric acid. Bonding agent was applied onto the canal walls/glass fiber post, air-dried gently and lightly cured for 15 s. Dual cure resin cement was applied to the canal walls and then fiber post was seated into the canal and excess cement was removed. A flowable resin composite was applied to the fractured tooth as well as a fragment and were reattached and light cured for 20 s from all aspects (facial, incisal, lingual, proximal). To improve the esthetics, a deep chamfer was placed at the fracture line after bonding. Then



Figure 1: Complicated coronal fracture of maxillary left central incisor number 21



Figure 2: Intact fracture fragment



Figure 3: After preparation of the fragment



Figure 4: Tooth number 21 after fragment reattachment

the composite resin was applied over that and light cured. Using a long needle shaped finishing bur the labial surface was polished. Finishing of the lingual surface was done using an egg shaped finishing bur. The tooth was functional and esthetically pleasing [Figure 4] during the follow-up at 3, 6, and 12 months posttreatment. Radiographic evaluation did not reveal any periapical and periodontal changes. The patient was satisfied with the treatment outcome.

DISCUSSION

Traumatic injuries to permanent anterior teeth are a tragic experience to young patients with collateral psychological impact. Conventional composite restorations can result in less than an ideal color match, surface texture, contours, and incisor translucency.^[5] Prosthodontic restorations in younger patients are associated with confounding variables such as large pulp, progressive eruption, and gingival marginal stability.^[6] Hence when possible, reattachment of the fractured segment should be a treatment option. In this case, a single visit apexification was decided based on patient's history and investigative findings. MTA was the material of choice because the main rationale was to create an apical stop to facilitate immediate root canal treatment. When more than 50% of the coronal structure is missing, use of post and core foundation is recommended prior to restoration.^[7] Restoration with cast metal posts can cause wedging forces coronally resulting in irreversible failure.^[8] Hence, to meet the patient's esthetic demand, glass fiber post was selected. Moreover, fiber post reduces chances of fracture as less tooth preparation is required, and it has a similar modulus of elasticity to dentin.

Previous study has suggested the use of conservative methods for reconstruction, such as reattachment when the immature development of the fractured tooth's gingival margins is encountered.^[9] It is also necessary to preserve fractured fragment in the hydrated environment as dentin's dehydration results in the collapse of collagen fibers and obstruction of adequate resin monomers' penetration leading to poor adhesion between dentin and composite material.^[10] A lasting dehydration of tooth's fragment can disturb the aesthetics. Although various reattachment strategies are advocated for reattaching a tooth fragment,^[11] our preferred choice was to create an internal retention slot on the dentin of the fracture fragment. Fractured teeth reattached without preliminary preparation have also shown fracture resistance as those of beveled 45-degrees.^[12] On the contrary another investigation results^[13] showed that reattachment without preliminary preparation results in poor outcome. However, some clinicians prepare chamfer

after reattachment and fill it with resin,^[14] as it helps to mask the visible reattachment line. Debonding of the fracture fragment should also be considered for shock absorption during accident-prone years as forces directed toward the pulp can result in necrosis and damage of the tooth. We conclude that glass fiber post offers an effective biologic reattachment of complicated fracture of the maxillary left immature permanent central incisor with optimal esthetic outcome.

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